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TOWNSHIP OF FENELON

COMMUNITY OF PLEASANT POINT

PRIVATE WELL CONTAMINATION

BY A PETROLEUM PRODUCT

F. R. Campbell

1972

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MINISTRY OF THE ENVIRONMENT

TOWNSHIP OF FENELON - COMMUNITY OF PLEASANT POINT INVESTIGATION OF PRIVATE WELL CONTAMINATION BY A PETROLEUM PRODUCT

INTRODUCTION

In response to a request from Mr. W. McClenaghan, Chief Inspector, Water and Well Management Section, an investigation of the contamination of ground-water supplies by a petroleum product in the Community of Pleasant Point has been completed. The problem was brought to Mr. McClenaghan's attention by a Mr. Ellis of Pleasant Point who drilled a 41-foot deep overburden well in June, 1971. Immediately upon completion of the well a strong petroleum odour was noticed in the well water. The location of the well is shown in Figure 1. Mr. Ellis completed the well, hoping that the problem would clear up quickly. However, the odour problem became worse, to the point that this water supply had to be abandoned.

FIELD INVESTIGATION

On July 27, 1971, a field investigation was conducted at which time the local topography was examined, well water samples were collected and local residents were interviewed. The new Ellis well was sampled and an odour was detected which seemed to be that of a petroleum product. Previously, this well water had been found to be bacteriologically unsatisfactory by the Department of Health.

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The Morrison well, shown in Figure 1, is a 62-foot deep bedrock well that serves as a domestic supply for the Morrison residence. The water has a taste of iron but no bacterial contamination. Three or four years ago a slight odour and taste of a petroleum product was noticed in the water from this well, but at the time of sampling no petroleum odour was detected in the water.

The Hemingway well was originally a dug well that was deepened into the bedrock to a total depth of 50 feet. Water from the Hemingway well was determined to be of satisfactory bacteriological quality by the Department of Health. No taste or odour problems have ever occurred in the water from this well and at the time of sampling, no odour was noticed.

A telephone conversation with the Hon. Leslie Frost disclosed that about two years ago, a well drilled on his property (Figure 1) contained water with an odd taste which could not be identified as a petroleum product. To his knowledge, unidentified taste and odour problems have been occurring in wells in the vicinity for 20 years or more. Mr. Frost has found that if he pumps his well moderately, the water has a satisfactory taste, odour and appearance. If the well is pumped for long periods of time an odour is distinguishable which may be that of sulphur gas or a petroleum product.

Mr. W. Leishman, who has been doing general maintenance work in the area for about 40 years, was contacted

with regard to other wells in the area having petroleum products in the water. He indicated that a 30-year history of water-quality problems existed in the area and that petroleum products had been found in various local wells throughout this period.

The only local, major source of gasoline is an out-of-service Shell tank on the Morrison property, as shown in Figure 1. The tank was reportedly drained of gasoline two or three years ago. No leakage problems were noticed during its 20 to 25 years of service.

GEOLOGY

The bedrock in the area comprises fossiliferous limestone of the Trenton Group of formations. The rock is fractured, fissile and flat-lying to slightly sloping toward the south-west. The overburden consists of stoney till and outwash sand and gravel deposits overlain by a drumlinized till deposit. These 30 to 40 foot thick deposits are well drained, permitting relatively easy percolation of contaminants to the underlying overburden and bedrock aquifers.

HYDROLOGY AND WATER QUALITY

Two aquifers are present in the study area; a relatively shallow overburden aquifer and a rock aquifer located near the top of the fractured limestone bedrock.

On the Ellis property, a shallow dug well yields water that is contaminated with bacteria. No well record is available for the well, but it would appear from the

record of Ellis' drilled well and the Hemingway well that the Ellis dug well is about 17 to 18 feet deep and obtains water from saturated sand lenses. The Hemingway well is a deepened dug well that at one time obtained water supplies at a depth of 17 feet. Other dug and drilled overburden wells in the area vary in depth from 16 to 41 feet and obtain supplies from sand and gravel deposits that are generally overlain by clay and sandy clay till.

Ground-water movement in the overburden aquifer would be expected to be in a northward direction toward Sturgeon Lake with discharge taking place into the lake. No petroleum product tastes or odours have been experienced in the water from the Ellis dug well. The Ellis' have begun chlorinating the water from their dug well which has eliminated the bacteria problem and rendered the water acceptable for drinking purposes.

The second aquifer in the area is located at a depth of 40 to 50 feet below grade and within the top 16 feet of the limestone bedrock. The elevation of the water-bearing zone is approximately 770 feet above mean sea level. From an analysis of the static water elevation data in the area, the direction of ground-water flow in the rock aquifer appears to be in a westwardly direction.

The water in the Ellis well contained 1.8 ppm of gasoline and 50 ppb phenols. The Morrison well water contained 0.7 ppm of gasoline and 30 ppb phenols. With a gasoline detection limit of 0.1 ppm, none of the other wells sampled in

the study area contained detectable amounts of gasoline. Similarly, none of these other wells contained phenol concentrations above normal background levels.

POSSIBLE SOURCES OF CONTAMINATION

The only apparently large source of gasoline in the study area is the out-of-service Shell tank on the Morrison property. The tank was reportedly drained of gasoline two or three years ago and no leakage problems were noticed during its 20 to 25 years of service. The tank remains in the ground.

Mr. Morrison stated that at one time, gasoline tanks were located between the Morrison and Ellis residences, but they were removed 33 years ago.

In addition to the above, it is possible that unreported gasoline spills have occurred in the area.

ALTERNATE SOURCES OF SUPPLY

Several alternatives are available to the affected parties which could be attempted to restore supplies. These include:

(1) A deep bedrock well could be drilled in an attempt to locate an uncontaminated aquifer. Care should be taken to ensure that any contaminated water zones are cased off and properly sealed to prevent downward percolation of contaminated water from the upper aquifers.

(2) Filters are available from commercial concerns in the water treatment field which may be effective in removing the low concentrations of gasoline in the

contaminated well waters. To aid in the efficiency of the filters, it may be necessary to pre-treat the well water with a separator or sand-filter prior to filtration.

(3) The shallow overburden aquifer appears to be unaffected by gasoline contamination but appears to be locally contaminated by feacal bacteria. If sufficient water is available, treatment of the water with a chlorinator may render this source of water acceptable for domestic purposes.

(4) A communal well could be installed by the affected parties in an uncontaminated area. However, difficulties may be encountered in piping the water because of property restrictions and local roads.

(5) Water could be hauled to the affected residents.

SUMMARY AND CONCLUSIONS

Mr. Ellis of Pleasant Point drilled a 41-foot deep well on his property in 1971. The water contained approximately 1.8 ppm gasoline and the supply was abandoned. During the field investigation, the Morrison well water was also found to contain gasoline at a concentration of 0.7 ppm. No other wells in the immediate area appeared to be affected by gasoline, although a history of petroleum product contamination exists in the study area. During prolonged pumping periods, the Frost well, Figure 1, may experience an influx of poorer quality water that may be similar to that which is found in the Ellis and Morrison wells.

Well-drained, 30- to 40-foot thick overburden deposits are present in the area on top of fractured limestone of the Trenton Group of formations. An overburden aquifer is present at a depth of 17 feet and a bedrock aquifer occurs within the top 16 feet of the limestone. Bacterial contamination of the upper aquifer and gasoline contamination of the lower aquifer exists in the area.

Bacterial contamination of the sandy upper aquifer may be a result of (1) poor well construction which is permitting the entrance of contaminated surface water into the well, (2) the sandy overburden being insufficient to renovate septic tank waste waters prior to their infiltration to the aquifer, or (3) dead animals being present in the well.

Ground-water flow in the gasoline-contaminated bedrock aquifer appears to be in a westwardly direction. Although no leaks or spills of gasoline were reported in the vicinity of the Shell tank, this appears to be the only potential large source of gasoline upgradient from the affected Ellis well. The tank is 120 feet downgradient from the Morrison well which also contains gasoline. Pumping of the Morrison well may account for the reversal of the ground-water gradient if in fact the Shell tank is the source of the gasoline. The Hon. L. Frost's well is not immediately downgradient from the Shell tank, but continual pumping of the well may draw product to it. In addition to the Shell tank, there is a possibility that unreported gasoline spills have taken place in the area.

As gasoline contamination of the aquifer has been present for many years, and there are several potential sources of pollution, a positive identification of the source is not possible.

RECOMMENDATIONS

It is recommended that the Ministry of Consumer and Commercial Relations advise Shell Canada Limited to remove the gasoline storage tanks from the Morrison property as the tanks are not in use and may be the source of the contaminant. The age of the tanks would make their future use questionable. When the tanks are removed, they should be examined for corrosion and the soil beneath the tanks should be examined for gasoline.

FRC/LB
26/09/72

Prepared by: F. R. Campbell, Hydrogeologist,
Surveys and Projects Section,
Water Quantity Management Branch.

Approved by: T. J. Yakutchik, Supervisor,
Surveys and Projects Section,
Water Quantity Management Branch.

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

WATER ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre = 1 lb. / 100,000 Imp. Gals.

Municipality: Pleasant Point: Fenelon Twp.

Source: Wells

Date Sampled: July 27/71 by: B.M.

Report to: F.R. Campbell
Surveys & Projects
Division of Water Resources
135 St. Clair Ave. W.

c.c. A. Redekopp
Central Files

bc

Lab. No.	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Sulphate as SO_4	Chloride as Cl	Alkalinity as $CaCO_3$	Hardness as $CaCO_3$	Iron as Fe	Total Solids			
W30-131	86	18	7	2.5	18	27	232	286	(23.)	410			
W30-132	94	35	7	5.1	14	34	330	378	8.5	460			
W30-133	83	14	6	3.0	27	9	230	266	0.25	310			
W30-134	122	7	6	1.1	26	15	290	332	2.1	380			
W30-135	79	15	5	1.9	28	6	224	260	0.45	300			
W30-136	12	<1	163	0.3	34	42	296	30	0.20	460			

W30-131	4444B	A. Ellis Well	11:30 am
W30-132	2B	Morrison Well	1:00 pm
W30-133	3B	Hemingway Well	1:30 pm
W30-134	4B	L. Frost Well	1:50 pm
W30-135	5B	Pleasant Point Well	2:00 pm
W30-136	6B	Schenk Well	2:30 pm

5M-60-31784

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

Organic Analysis

1 p.p.m. = 1 mgm. / litre = 1 lb. / 100,000 Imp. Gals.

Municipality: Pleasant Point, Fenelon Twp. Report to: F.R. Campbell, Surveys and Projects, 6 - 40 St. Clair Ave. W.
G.A. Rees
P. Diosady

c.c. Central Files

Source: Wells

Date Sampled: July 27/71 by: B.M.

mm

Lab. No.	Gasoline ppm	Fuel Oil
0-1437	1.8	N.D.
0-1438	0.7	N.D.
0-1439	N.D.	N.D.
0-1440	N.D.	N.D.
0-1441	N.D.	N.D.
0-1442	N.D.	N.D.

N.D. - None detected.
Gasoline detection limit 0.1 ppm Fuel Oils etc. Detection limit 1 ppm

0-1437	444A	A. Ellis Well	11.30 a.m.
0-1438	2A	Morrison Well	1.00 p.m.
0-1439	3A	Hemmingway Well	1.30 p.m.
0-1440	4A	N. Frost Well	1.50 p.m.
0-1441	5A	Pleasant Point Well	2.00 p.m.
0-1442	6A	Schenk Well	2.30 p.m.

5M-60-31784

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

M I S C E L L A N E O U S

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Pleasant Point - Fenelon Twonship
Source: Wells

Report to: F. Campbell, Surveys & Projects ✓ c.c. Central Files

Date Sampled: 27/7/71 by: B.M.

b

Lab. No.	Phenols in ppb.*
M30-162	50
M30-163	30
M30-164	2
M30-165	2
M30-166	4
M30-167	2

* Test performed on preserved sample

M30-162	4444	A. Ellis well	11:30 a.m.
M30-163	2	Morrison well	1:00 p.m.
M30-164	3	Hemingway well	1:30 p.m.
M30-165	4	L. Frost well	1:50 p.m.
M30-166	5	Pleasant Point well	2:00 p.m.
M30-167	6	Schenk well	2:30 p.m.

5M-60-12969

ONTARIO WATER RESOURCES COMMISSION — DIVISION OF LABORATORIES

BACTERIOLOGICAL REPORT

FILE: Pleasant Point & Fehelon Twp.-Wells

DATE: SAMPLED D M Y: 27 771 | ANALYSED D M Y: 29 771 | REPORTED D M Y: 9 871 | 323398 323402

REPORT TO: F. R. Campbell, Surveys & Projects, Div. of Water Resources, 135 St. Clair Ave. W., Toronto

COPY TO:

PARTICULARS:

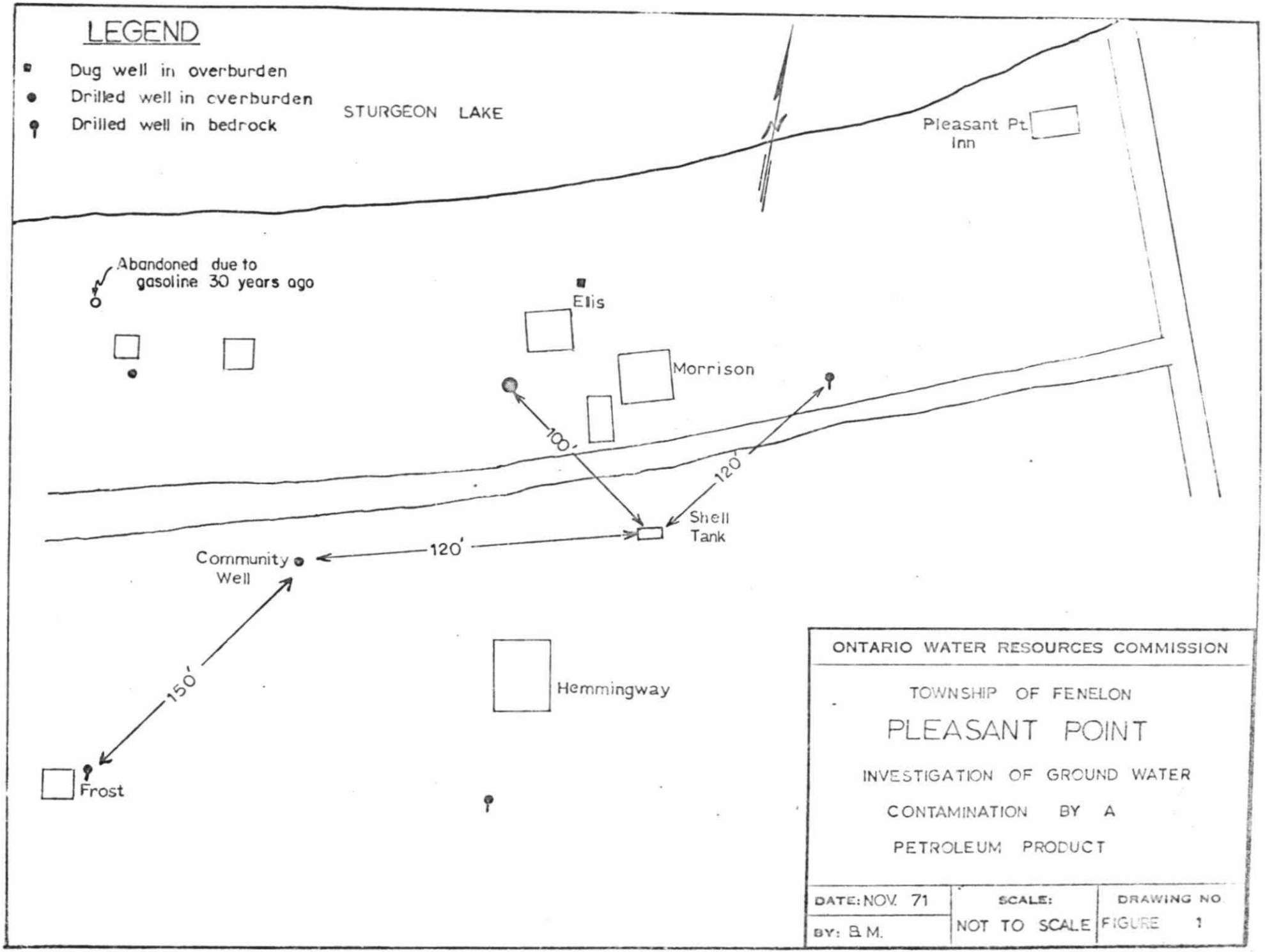
RESULTS PER 100 ML:

LAB NO.	PARTICULARS		FECAL COLIFORMS	PLATE COUNT	BACKGROUND COLONIES	COLIFORM BACTERIA
323398	4444 A. Ellis Well 11:30 a.m.	323398	0			26
			STREPTOCOCCUS: 16	PSEUDOMONAS:	CLOSTRIDIUM:	
323399	2 Morrison Well 1:00 a.m.	323399	0			0
			STREPTOCOCCUS: 0	PSEUDOMONAS:	CLOSTRIDIUM:	
323400	3 Hemingway Well 1:30 p.m.	323400	0			0
			STREPTOCOCCUS: 0	PSEUDOMONAS:	CLOSTRIDIUM:	
323401	4 L. Frost Well 1:50 p.m.	323401	0			0
			STREPTOCOCCUS: 0	PSEUDOMONAS:	CLOSTRIDIUM:	
323402	5 Pleasant Point Well 2:00 p.m.	323402	0			142
			STREPTOCOCCUS: 4	PSEUDOMONAS:	CLOSTRIDIUM:	
			FECAL COLIFORMS:	PLATE COUNT:	BACKGROUND COLONIES:	COLIFORM BACTERIA:
			STREPTOCOCCUS:	PSEUDOMONAS:	CLOSTRIDIUM:	
			FECAL COLIFORMS:	PLATE COUNT:	BACKGROUND COLONIES:	COLIFORM BACTERIA:
			STREPTOCOCCUS:	PSEUDOMONAS:	CLOSTRIDIUM:	
			FECAL COLIFORMS:	PLATE COUNT:	BACKGROUND COLONIES:	COLIFORM BACTERIA:
			STREPTOCOCCUS:	PSEUDOMONAS:	CLOSTRIDIUM:	

ONTARIO WATER RESOURCES COMMISSION
AUG 1 9 1971
ONTARIO WATER RESOURCES

+ CHLORINE PRESENT
G & L MEANS GREATER THAN & LESS THAN

SEE REVERSE SIDE FOR INTERPRETATION


LEGEND
Dug well in overburden
Drilled well in overburden
Drilled well in bedrock
STURGEON LAKE
Pleasant Pt. Inn
Abandoned due to gasoline 30 years ago
Ellis
Morrison
100'
120'
Shell Tank
120'
Community Well
150'
Hemmingway
Frost
ONTARIO WATER RESOURCES COMMISSION
TOWNSHIP OF FENELON
PLEASANT POINT
INVESTIGATION OF GROUND WATER CONTAMINATION BY A PETROLEUM PRODUCT
DATE: NOV. 71
BY: B.M.
SCALE: NOT TO SCALE
DRAWING NO. FIGURE 1

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1972

Township of Fenelon,
Community of Pleasant Point :
private well contamination by a
petroleum product / Campbell,

78428